

## WHAT IS CLAIMED IS:

1           1.       A method of generating a graphical bar code, comprising:  
2           applying an invertible graphical operation between regions of a base image  
3           and information-encoding graphical templates selected from a predefined template  
4           set to produce a graphical bar code with regions from which graphical templates are  
5           recoverable by applying an inverse graphical operation between graphical bar code  
6           regions and corresponding base image regions.

1           2.       The method of claim 1, wherein the invertible graphical operation  
2           corresponds to an exclusive OR (XOR) operation.

1           3.       The method of claim 2, further comprising applying XOR operations  
2           between the graphical bar code regions and corresponding base image regions to  
3           produce the graphical templates.

1           4.       The method of claim 1, wherein each of the base image regions and the  
2           graphical templates has the same number of pixels.

1           5.       The method of claim 4, wherein each of the base image regions and the  
2           graphical templates has a common pixel layout.

1           6.       The method of claim 5, wherein the common pixel layout corresponds  
2           to a rectangular pixel array.

1           7.       The method of claim 1, wherein each graphical template comprises a  
2           pattern of bright and dark pixels.

1           8.       The method of claim 7, wherein the number of bright pixels is greater  
2           than the number of dark pixels.

1           9.       The method of claim 7, wherein each pixel location within the  
2           predefined template set has an equal probability of being a dark pixel.

0987516-060701  
T02090-9T52860

1           10.    The method of claim 1, wherein the graphical templates are ordered  
2   adaptively in accordance with one or more predefined rules relating to disfavored  
3   graphical template sequences.

1           11.    A computer program residing on a computer-readable medium and  
2   comprising computer-readable instructions for causing a computer to:  
3           apply an invertible graphical operation between regions of a base image and  
4   information-encoding graphical templates selected from a predefined template set to  
5   produce a graphical bar code with regions from which graphical templates are  
6   recoverable by applying an inverse graphical operation between graphical bar code  
7   regions and corresponding base image regions.

1           12.    A method of decoding a graphical bar code, comprising:  
2           applying an invertible graphical operation between regions of a graphical bar  
3   code and corresponding regions of a base image to produce a set of measurement  
4   blocks; and  
5           selecting from a predefined template set information-encoding graphical  
6   templates corresponding to the set of measurement blocks with the highest estimated  
7   probability.

1           13.    The method of claim 12, wherein the invertible graphical operation  
2   corresponds to an XOR operation.

1           14.    The method of claim 12, further comprising computing pixel value  
2   probabilities for each of the measurement blocks.

1           15.    The method of claim 14, wherein pixel value probabilities are  
2   computed for a given measurement block based upon a weighted average of gray  
3   value measurements over the given measurement block.

1 A3 16.    The method of claim 15, wherein the weighted average of gray values  
2   ~~is computed by fitting a mask to the dot locations over the given measurement block.~~

1           17.    The method of claim 16, wherein the mask has a truncated Gaussian  
2   profile.

1           18.    The method of claim 15, further comprising estimating parameters of  
2   probability distributions fit to a histogram of the weighted average of gray value  
3   measurements.

1           19.    The method of claim 18, wherein the probability distributions are  
2   asymmetric Laplacian distributions.

1           20.    A computer program residing on a computer-readable medium and  
2   comprising computer-readable instructions for causing a computer to:

3            apply an invertible graphical operation between regions of a graphical bar  
4   code and corresponding regions of a base image to produce a set of measurement  
5   blocks; and

6            select from a predefined template set information-encoding graphical  
7   templates corresponding to the set of measurement blocks with the highest estimated  
8   probability.

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